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Page 1 of 37

# Test Report

Verified code: 746553

Report No.: E20230828994601-4

Customer: Lumi United Technology Co., Ltd

Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

Sample Name: Motion and Light Sensor P2

Sample Model: ML-S03D

Receive Sample Date: Aug.28,2023

Test Date: Sep.05,2023 ~ Oct.27,2023

Reference Document: ETSI EN 301 489-17 V3.2.4 (2020-09)  
Section 7.1.1 RADIATED EMISSION  
Section 7.2.1 ELECTROSTATIC DISCHARGE  
Section 7.2.1 RF ELECTROMAGNETIC FIELD  
ETSI EN 301 489-1 V2.2.3(2019-11)  
Section 8.2 RADIATED EMISSION  
Section 9.2 RADIO FREQUENCY ELECTROMAGNETIC FIELD  
Section 9.3 ELECTROMAGNETIC FIELD  
EN 55032:2015/A11:2020  
Table A.4 and Table A.5 RADIATED EMISSION  
EN 55035:2017/A11:2020  
Section 4.2.1 ELECTROSTATIC DISCHARGE(ESD)  
Section 4.2.2.2 CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES  
Section 4.2.3 POWER FREQUENCY MAGNETIC FIELD

Test Result: Pass

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Reviewed by: Jimmy Tan  
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GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-11-24



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## Statement

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2. The sample information is provided by the client and responsible for its authenticity; The content of the report is only valid for the samples sent this time.
3. When there are reports in both Chinese and English, the Chinese version will prevail when the language problems are inconsistent.
4. If there is any objection concerning the report, please inform us within 15 days from the date of receiving the report.
5. Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20230828994601-4	Original Issue	2023-11-01

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## 1. TEST RESULT SUMMARY

### Emissions

Test Item	Test mode	Equipment test requirement	Test Method	Class / Severity	Test Result
<b>Performance Standard:</b> <b>ETSI EN 301 489-17 V3.2.4 (2020-09)&amp;ETSI EN 301 489-1 V2.2.3 (2019-11)&amp;EN 55032:2015/A11:2020</b>					
Radiated Emission	Mode 1	ETSI EN 301 489-17/7.1.1 ETSI EN 301 489-1/8.2	EN 55032:2015 Table A.4 and A.5	Table A.4 Class B Table A.5 Class B	PASS
Radiated Emission	Mode 1	EN 55032:2015/A11:2020/ Table A.4 and Table A.5	EN 55032:2015/A11:2020 Table A.4 and A.5	Table A.4 Class B Table A.5 Class B	PASS

### Immunity

Test Item	Test mode	Equipment test requirement	Test Method	Class / Severity	Test Result
<b>Performance Standard:</b> <b>ETSI EN 301 489-17 V3.2.4 (2020-09)&amp;ETSI EN 301 489-1 V2.2.3 (2019-11)&amp;EN 55035:2017/A11:2020</b>					
Electrostatic discharge (ESD)	Mode 1	ETSI EN 301 489-17/7.2.1 ETSI EN 301 489-1/9.3	EN 61000-4-2:2009	Test specification: ±2kV, ±4kV, ±8kV air discharge ±4kV Contact discharge Performance : Criteria B	PASS
Electrostatic discharge (ESD)	Mode 1	EN 55035:2017/A11:2020 Section 4.2.1	EN 61000-4-2:2009	Test specification: ±2kV, ±4kV, ±8kV air discharge ±4kV Contact discharge Performance : Criteria B	PASS
RF electromagnetic field (RS)	Mode 1	ETSI EN 301 489-17/7.2.1 ETSI EN 301 489-1/9.2	EN 61000-4-3:2006+A1:2008+A2:2010	Test specification: Test level: For the frequency range 80MHz to 6000MHz, test level shall be 3 V/m, 80% AM(1kHz) Performance: Criteria A	PASS
RF electromagnetic field (RS)	Mode 1	EN 55035:2017/A11:2020 Section 4.2.2.2	EN 61000-4-3:2006+A1:2008+A2:2010	Test specification: For the frequency range 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz test level shall be 3 V/m, 80% AM(1kHz) Performance: Criteria A	PASS
Power frequency magnetic field	Mode 1	EN 55035:2017/A11:2020 Section 4.2.3	EN 61000-4-8:2009	1A/m 50Hz&60Hz Performance Criterion A	PASS

Note :The EUT is no AC mains power ports.

## 2. GENERAL DESCRIPTION OF EUT

### 2.1 APPLICANT

Name: Lumi United Technology Co., Ltd  
Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd  
Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Product Name: Motion and Light Sensor P2  
Product Model: ML-S03D  
Adding Model: ML-S03E  
Model difference: ML-S03E & ML-S03D have the same technical construction including circuit diagram, PCB LAYOUT, hardware version and software version identical, except sales area and packaging are different.  
Trade Name: Aqara  
Power Supply: DC 3V power supplied by battery  
Battery Specification: Model:CR2450  
Norminal Voltage:3.0Vdc  
Frequency Band: 2402MHz – 2480MHz for BLE, 2405MHz-2480MHz for Thread  
Hardware Version: X3  
Software Version: 0.0.0.1  
Temperature Range: -10 ℃ ~ 55 ℃  
Sample submitting way: ☒ Provided by customer ☐ Sampling  
Sample No: E20230828994601-0011

Note 1: This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.

Note 2: All the tests were performed on the model ML-S03D.



## 2.4 TEST MODE

Mode No.	Description of the modes
Mode 1	The EUT is paired with the homepod mini via Bluetooth, after the successful pairing, the thread protocol is used to keep the connection with the homepod mini, and the EUT is in a human body sensing state.

## 2.5 EUT OPERATING DESCRIPTIONS

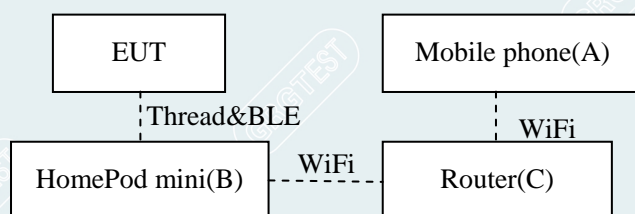
No.	Operating description
a)	The mobile phone and homepod mini are connected to the external network of the router, and the EUT is connected to the homepod min through the pairing of home software on the mobile phone, and the Bluetooth&thread connection is maintained in the homepod mini, and the EUT is in a human body sensing state.

## 2.6 LOCAL SUPPORTIVE INSTRUMENTS

No.	Name of Equipment	Manufacturer	Model	Serial Number	Note
A	Mobile phone	Apple	MLDU3CH/A	/	/
B	Homepod mini	Apple	A2531	/	/
C	Router	ASUS	GT-AXE11000	/	/

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	/	/	/	/	/

## 2.7 CONFIGURATION OF SYSTEM UNDER TEST



### 3. LABORATORY AND ACCREDITATIONS

#### 3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add.: No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District  
Shenzhen, 518110, People's Republic of China.  
P.C.: 518110  
Tel : 0755-61180008  
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#### 3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

China  CNAS(L0446)

Copies of granted accreditation certificates are available for downloading from our web site,  
<http://www.grgtest.com>

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#### 4. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Radiated Emission (3m)	30MHz ~ 200MHz(H)	4.6 dB <sup>1)</sup>
	200MHz ~ 1000MHz(H)	4.8 dB <sup>1)</sup>
	30MHz ~ 200MHz(V)	4.7 dB <sup>1)</sup>
	200MHz ~ 1000MHz(V)	4.7 dB <sup>1)</sup>
	1GHz ~ 6GHz(H)	5.0 dB <sup>1)</sup>
	1GHz ~ 6GHz(V)	5.1 dB <sup>1)</sup>
Electrostatic discharge	/	2)
Radio-Frequency Electromagnetic Field	/	2)
Power frequency magnetic field	/	2)

<sup>1)</sup> This uncertainty represents an expanded uncertainty expressed at approximately the 95%.

This uncertainty represents an expanded uncertainty factor of  $k=2$ .

<sup>2)</sup> Tests have proved that, test system meet the requirements of the standard with a confidence level of not less than 95%.

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## 5. LIST OF USED TEST EQUIPMENT AT GRGT

### 5.1 LIST OF USED TEST EQUIPMENT

Name of equipment	Manufacturer	Model	Serial number	Calibration due
<b>Radiated Emission (Below 1GHz)</b>				
Test S/W	EZ	CCS-03A1	/	/
Test Receiver	R&S	ESR26	101758	2023/10/27
Preamplifier	SHIRONG ELECTRONIC	DLNA-30M1G-G41	20200928001	2024/08/11
Bi-log Antenna	Schwarzbeck	VULB 9160	VULB9160-3401	2023/12/26
<b>Radiated Emission (Above 1GHz)</b>				
Test software	Tonscend	JS32-RE	/	/
Test Receiver	R&S	ESR26	101758	2023/10/27
Preamplifier	Tonscend	TAP01018048	AP20E8060075	2024/04/11
Horn Antenna	Schwarzbeck	BBHA 9120D	02143	2024/09/23
<b>Electrostatic discharge</b>				
Dito ESD Simulator	EM Test	dito	V0809103493	2024/09/21
<b>Radio-Frequency Electromagnetic Field</b>				
Signal generator	R&S	SMA100A	100434	2024/07/09
Switch	TOYO	BS5000	/	/
Amplifier	Schaffner	CBA9433	3007	2024/04/27
Amplifier	TESEQ	CBA3G-050	T44161	2024/03/02
Amplifier	Milmega	AS1860-50	1079232	2024/03/02
Dual directional Coupler	AR	DC 6180A	0328212	2024/08/11
Dual directional Coupler	AR	DC 7144A	327057	2024/08/11
Log Periodic Antenna	Schaffner	CBL6143	5082	2023/12/17
Microwave Log.-Per. Antenna	Schwarzbeck	STLP9149	9149-163	2024/08/26
Power Meter	Keysight	N1914A	MY57090009	2024/09/25
Power Sensor	Keysight	E9301A	MY57060008	2024/07/09
Power Probe	Keysight	E9301A	MY56520006	2024/07/09
Test software	Tonscend	JS35-RS	/	/

Power frequency magnetic field				
Test S/W	TESEQ	Win2120 Ver6.00	/	/
Power Source	SCHAFFNER	NSG1007	54789	2024/02/09
Power Frequency Magnetic Field Signal Generator	SCHAFFNER	INA2141	6003	2024/04/14
Induction coil Interface	SCHAFFNER	INA-702	711-1115	2024/07/14

Note: The calibration interval of the test instruments is 12 months.

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## 6. EMISSION TEST

### 6.1 RADIATED EMISSION MEASUREMENT (RE)

Test Requirement: ETSI EN 301 489-17 V3.2.4/7.1.1  
 ETSI EN 301 489-1 V2.2.3/8.2  
 EN 55032:2015/A11:2020

Test Method: EN 55032 /annex A.2

#### 6.1.1 LIMITS

The ancillary equipment shall meet the class B limits given in CENELEC EN 55032 [1], annex A tables A.4 and A.5.

**Table A.4 – Requirements for radiated emissions at frequencies up to 1 GHz  
for class B equipment**

Frequency range(MHz)	Distance (m)	Bandwidth	Limits (dBuV/m)		
			Peak (PK)	Quasi-peak (QP)	Average (Avg)
30~230	3	120kHz	/	40	/
230~1000	3	120kHz	/	47	/

**Table A.5 – Requirements for radiated emissions at frequencies above 1 GHz  
for class B equipment**

Frequency range(MHz)	Distance (m)	Bandwidth	Limits (dBuV/m)		
			Peak (PK)	Quasi-peak (QP)	Average (Avg)
1000~3000	3	1MHz	70	/	50
3000~6000	3	1MHz	74	/	54

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## 6.1.2 TEST PROCEDURE

### (1) Procedure of Preliminary Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height  $0.8\text{ m} \pm 0.01\text{ m}$ , CISPR 16-1-4 specifies the method to determine the impact of the non-conductive set-up table on test results.

- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Note: This is table-top equipment.

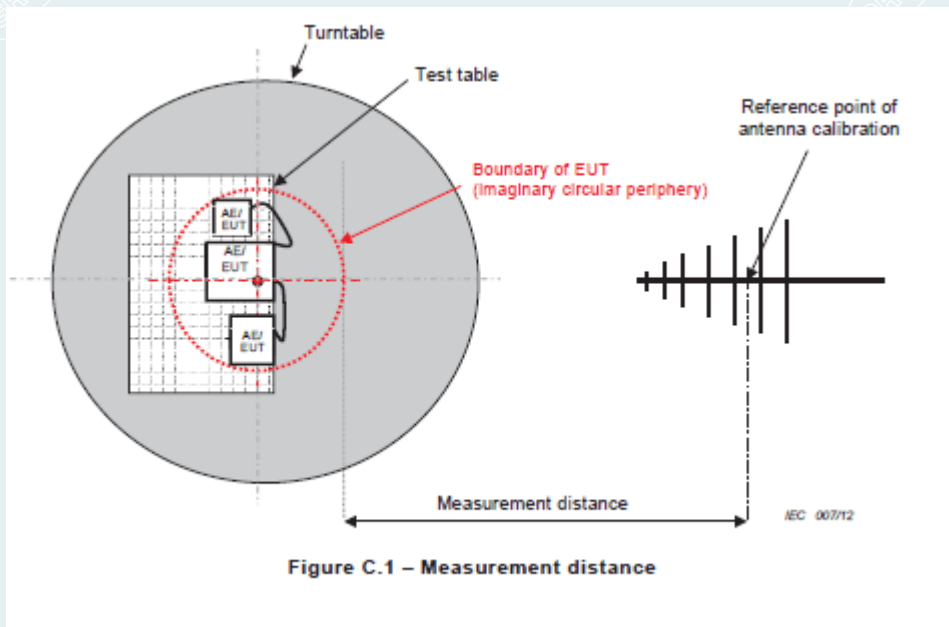
Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) were scanned during the preliminary test. After the preliminary scan, we found the test mode producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

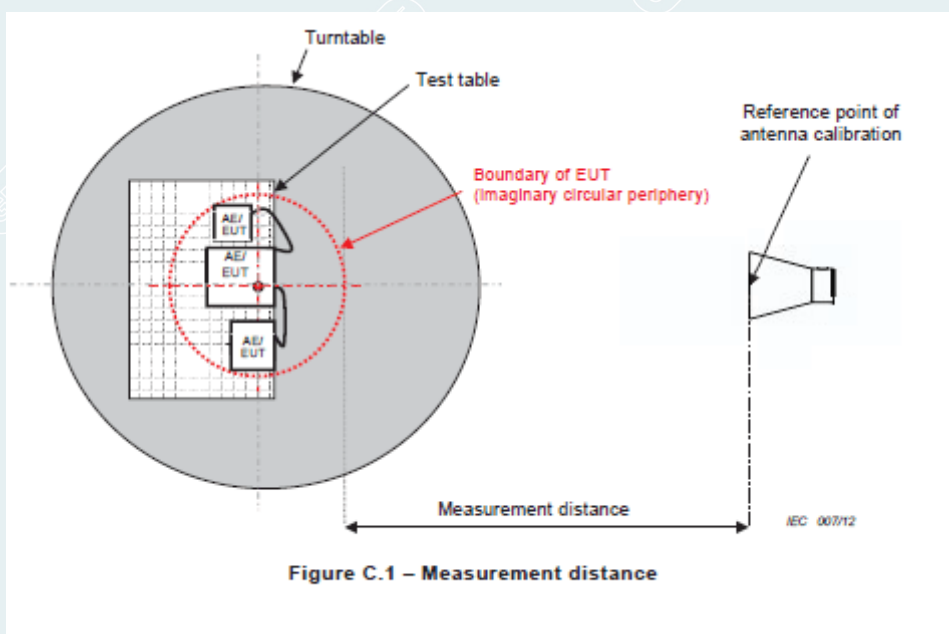
### (2) Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test. The Analyzer/ Receiver scanned from 30MHz to 1000MHz and 1000MHz to 6000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level. Record at least six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and for 30MHz~1000MHz only QP reading is presented, for 1000MHz~6000 MHz Peak and AVG reading is presented.

### 6.1.3 TEST SETUP



Below the frequency of 1GHz



Above the frequency of 1GHz(1GHz-6GHz)

### 6.1.4 DATA SAMPLE

#### Below 1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Heigh (cm)	Detectorty pe
XXX.XXXX	48.49	-9.91	38.58	47.00	-8.42	100	108	QP

Frequency (MHz)	= Emission frequency in MHz
Reading (dBuV)	= Uncorrected Analyzer / Receiver reading
Correct Factor (dB/m)	= Antenna factor + Cable loss – Amplifier gain
Result (dBuV/m)	= Reading (dBuV) + Correct Factor (dB/m)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	= Result (dBuV/m) – Limit(dBuV/m)
QP	= Quasi-peak Reading

#### Above 1GHz

Frequency (MHz)	Reading (dBuV/m)	Level (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Margin (dB)	Heigh (cm)	Angle (deg.)	Remark
XXXX	56.70	34.18	-22.52	74	39.82	100	23	Peak
XXXX	46.34	23.80	-22.54	54	30.20	100	214	AVG

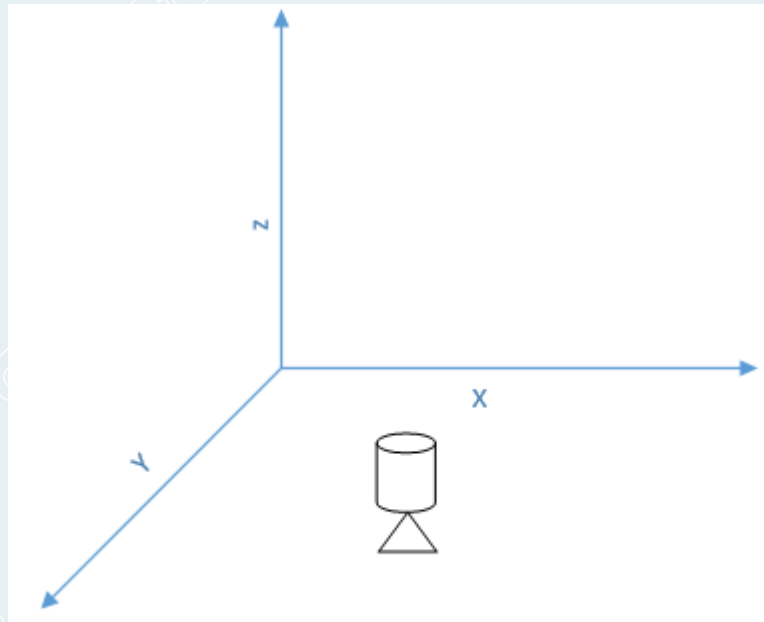
Frequency (MHz)	= Emission frequency in MHz
Reading (dBuV)	= Uncorrected Analyzer / Receiver reading
Factor (dB)	= Antenna factor + Cable loss – Amplifier gain
Level (dBuV/m)	= Reading (dBuV/m) +Factor (dB)
Limit (dBuV/m)	= Limit stated in standard
Margin (dB)	=Limit(dBuV/m)- Level(dBuV/m)
Peak	= Peak Reading
AVG	= Average Reading

### 6.1.5 PHOTOGRAPH OF THE TEST ARRANGEMENT

Please refer to the attached document E20230828994601-15 Test Photo.

### 6.1.6 TEST RESULTS

The test are under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown the Z position only.



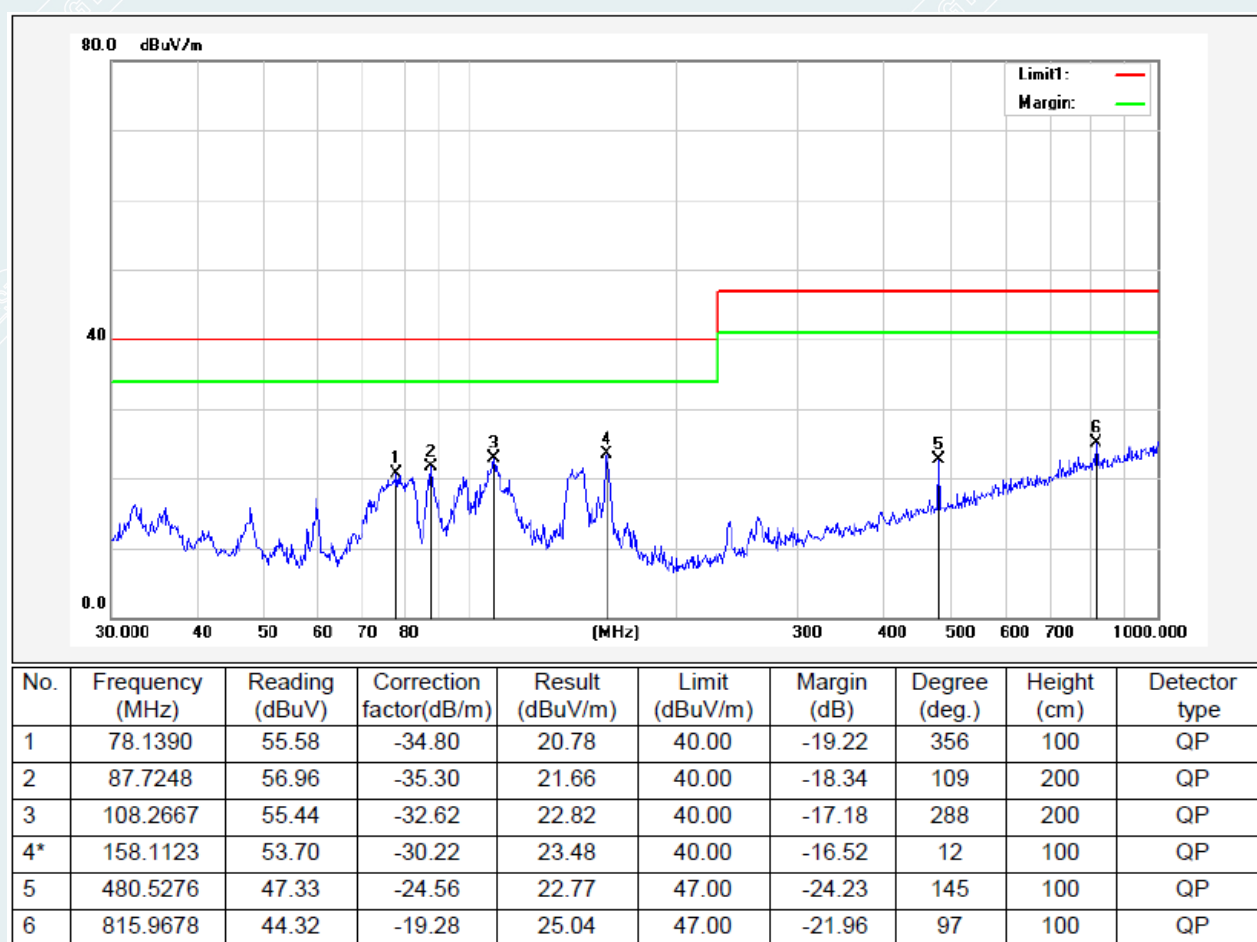
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Below 1GHz

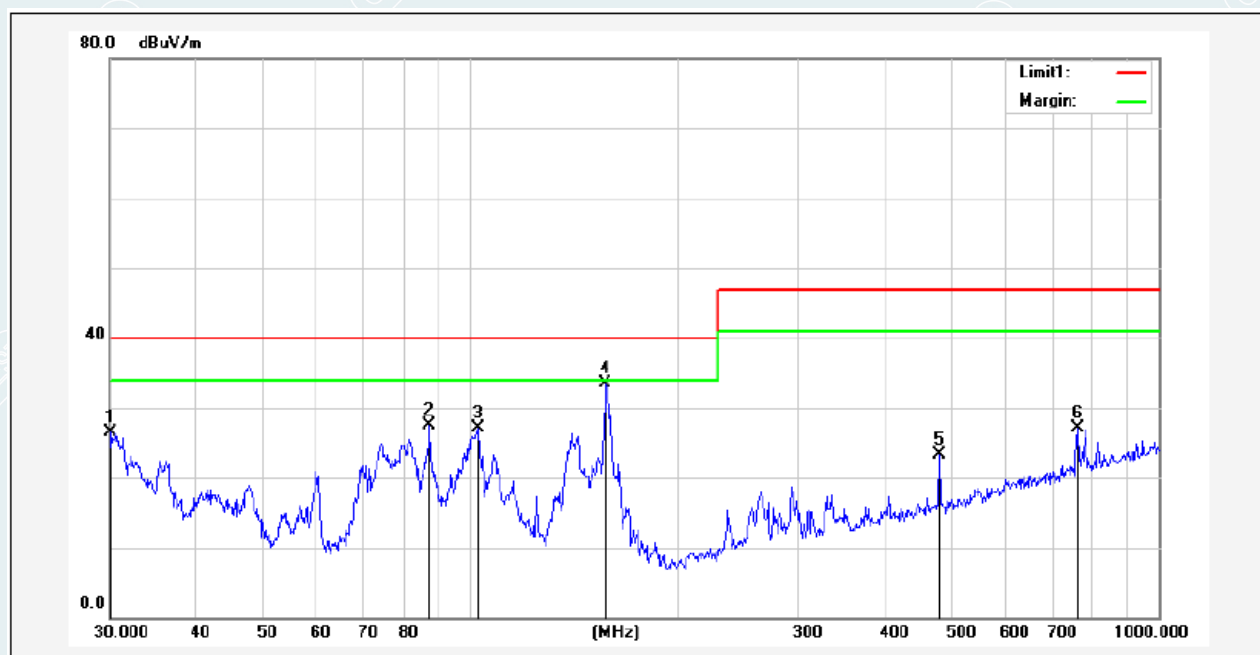
EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	25.5°C/55%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-09-05	Sample No.	E20230828994601-0011

Polarity: Horizontal



EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	25.5°C/55%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-09-05	Sample No.	E20230828994601-0011

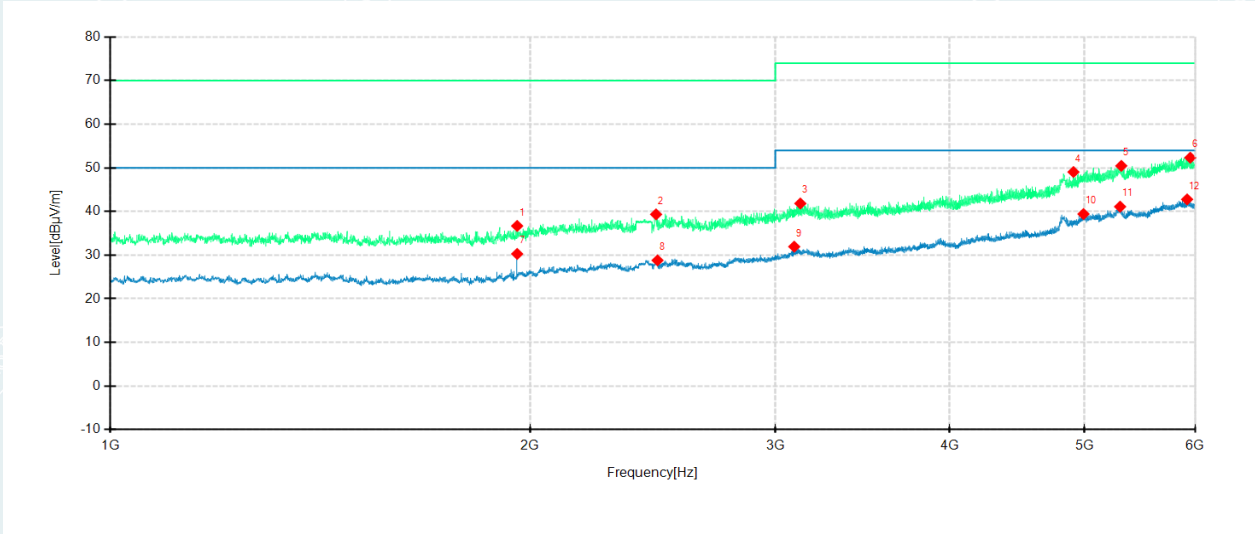
Polarity: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Detector type
1	30.1054	57.16	-30.71	26.45	40.00	-13.55	308	200	QP
2	87.4177	62.75	-35.31	27.44	40.00	-12.56	327	100	QP
3	102.7192	60.41	-33.26	27.15	40.00	-12.85	137	100	QP
4*	157.5588	63.72	-30.21	33.51	40.00	-6.49	85	100	QP
5	480.5276	47.81	-24.56	23.25	47.00	-23.75	348	200	QP
6	763.3757	46.80	-19.64	27.16	47.00	-19.84	319	100	QP

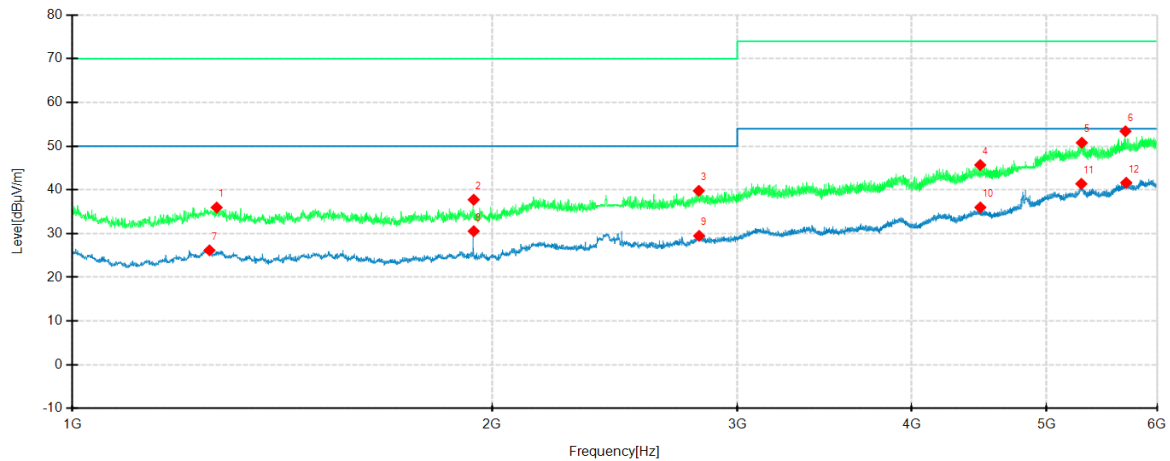
Above 1GHz

EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	25.5℃/55%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-09-05	Sample No.	E20230828994601-0011



Suspected Data List									
NO	Freq. [MHz]	Reading[dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1958.500	55.11	36.69	-18.42	70.00	33.31	200	231	Horizontal
2	2463.500	55.70	39.35	-16.35	70.00	30.65	100	345	Horizontal
3	3126.500	54.25	41.84	-12.41	74.00	32.16	100	256	Horizontal
4	4909.000	54.25	49.06	-5.19	74.00	24.94	100	166	Horizontal
5	5312.500	53.00	50.46	-2.54	74.00	23.54	200	16	Horizontal
6	5953.500	54.52	52.33	-2.19	74.00	21.67	100	179	Horizontal
7	1958.500	48.70	30.28	-18.42	50.00	19.72	200	231	Horizontal
8	2469.500	45.01	28.80	-16.21	50.00	21.20	200	320	Horizontal
9	3095.000	44.69	31.95	-12.74	54.00	22.05	200	16	Horizontal
10	4991.000	43.60	39.42	-4.18	54.00	14.58	100	217	Horizontal
11	5302.000	43.26	41.11	-2.15	54.00	12.89	100	331	Horizontal
12	5922.500	45.22	42.78	-2.44	54.00	11.22	100	294	Horizontal

EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	25.5℃/55%RH/101.0kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-09-05	Sample No.	E20230828994601-0011



#### Suspected Data List

NO	Freq. [MHz]	Reading[dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1269.500	55.32	35.97	-19.35	70.00	34.03	200	318	Vertical
2	1941.000	56.64	37.76	-18.88	70.00	32.24	200	155	Vertical
3	2815.000	54.08	39.80	-14.28	70.00	30.20	200	80	Vertical
4	4481.000	53.31	45.69	-7.62	74.00	28.31	100	52	Vertical
5	5300.000	52.96	50.79	-2.17	74.00	23.21	200	306	Vertical
6	5696.000	56.03	53.41	-2.62	74.00	20.59	200	54	Vertical
7	1254.500	45.29	26.17	-19.12	50.00	23.83	100	167	Vertical
8	1941.000	49.44	30.56	-18.88	50.00	19.44	200	155	Vertical
9	2816.500	43.77	29.49	-14.28	50.00	20.51	200	306	Vertical
10	4481.500	43.62	36.00	-7.62	54.00	18.00	100	117	Vertical
11	5295.500	43.73	41.39	-2.34	54.00	12.61	100	294	Vertical
12	5703.000	44.26	41.64	-2.62	54.00	12.36	200	293	Vertical

Remark: The fundamental frequency or multiple of fundamental frequency's limit is controlled to the standard of Radio frequency.

## 7. IMMUNITY TEST

### 7.1 GENERAL DESCRIPTION

Test Item	Test Specification Level	Basic Standard	Test method	Test Ports	Performance criteria
Electrostatic discharge (ESD)	Contact Discharge: $\pm 4$ kV Air Discharge: $\pm 2$ kV, $\pm 4$ kV, $\pm 8$ kV (Direct mode)	ETSI EN 301 489-17 V3.2.4 /7.2.1 ETSI EN 301 489-1 V2.2.3/9.3	EN 61000-4-2	Enclosure	B
	HCP discharge: $\pm 4$ kV VCP discharge: $\pm 4$ kV (Indirect mode)	EN 55035:2017/A11: 2020 Table 1			
Continuous RF electromagnetic field disturbances	Frequency range: 80 MHz to 6000 MHz, 3V/m(unmodulated, r.m.s), 1kHz Sine Wave, 80% AM modulated	ETSI EN 301 489-1 V2.2.3/9.2 ETSI EN 301 489-17 V3.2.4 /7.2.1	EN 61000-4-3	Enclosure	A
Continuous RF electromagnetic field disturbances	Frequency range: 80 MHz to 1000 MHz, 1800 MHz, 2600 MHz, 3500 MHz , 5000 MHz, 3V/m(unmodulated, r.m.s), 1kHz Sine Wave, 80% AM modulated	EN 55035:2017/A11: 2020 Table 1	EN 61000-4-3	Enclosure	A
Power frequency magnetic field	1A/m(r.m.s) 50Hz and 60Hz	EN 55035:2017/A11: 2020 Table 1	EN 61000-4-8	Enclosure	A

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## 7.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION (ETSI EN 301 489-1/17)

### 7.2.1 GENERAL PERFORMANCE CRITERIA

The performance criteria are:

- Performance criteria A for immunity tests with phenomena of a continuous nature;
- Performance criteria B for immunity tests with phenomena of a transient nature;
- Performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

**Performance table**

Criteria	During Test	After test (i.e. as a result of the application of the test)
A	Shall operate as intended. (See note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.

NOTE: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.

Performance Criteria	Description
Performance criteria for continuous phenomena applied to transmitters and receivers	If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for continuous phenomena shall apply. During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance. During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Performance criteria for transient phenomena applied to transmitters and receivers	If no further details are given in the relevant part of EN 301 489 series [i.13] dealing with the particular type of radio equipment, the following general performance criteria for transient phenomena shall apply. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies: <ul style="list-style-type: none"> <li>• For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A SW reboot is not allowed.</li> </ul>

	<p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p> <ul style="list-style-type: none"> <li>• For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. A SW reboot is not allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</li> </ul> <p>For all other ports the following applies:</p> <ul style="list-style-type: none"> <li>• After the test, the equipment shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the equipment is used as intended. In some cases this permissible performance level may be replaced by a permissible loss of performance.</li> <li>• During the EMC exposure to an electromagnetic phenomenon, a degradation of performance is, however, allowed. No change of the actual mode of operation (e.g. unintended transmission) or stored data is allowed.</li> <li>• If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be deduced from the product description and documentation and what the user may reasonably expect from the equipment if used as intended.</li> </ul>
Performance criteria for equipment which does not provide a continuous communication link	<p>For radio equipment which does not provide a continuous communication link, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.</p>
Performance criteria for ancillary equipment tested on a stand alone basis	<p>If ancillary equipment is intended to be tested on a stand alone basis, the performance criteria described in clauses 6.1 and 6.2 are not appropriate, in these cases the manufacturer shall declare, for inclusion in the test report, his own specification for an acceptable level of performance or degradation of performance during and/or after the immunity tests. The performance specification shall be included in the product description and documentation. The related specifications set out in clause 5.3 have also to be taken into account. The performance criteria specified by the manufacturer shall give the same degree of immunity protection as called for in clauses 6.1 and 6.2.</p>

Performance Criteria	Description
CT	The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an ACKnowledgement (ACK) or Not ACKnowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
TT	The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
CR	The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.
TR	The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

Note:

Criterion A applies for immunity tests with phenomena of a continuous nature. (CT, CR)

Criterion B applies for immunity tests with phenomena of a transient nature. (TT, TR)

Criterion C for immunity tests with power interruptions exceeding a certain time.

### 7.2.2 MINIMUM PERFORMANCE LEVEL

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

### 7.2.3 PERFORMANCE CRITERIA FOR CONTINUOUS PHENOMENA

The performance criteria A shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.

### 7.2.4 PERFORMANCE CRITERIA FOR TRANSIENT PHENOMENA

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply.

Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test.

Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

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### 7.3 GENERAL PERFORMANCE CRITERIA DESCRIPTION (EN 55035)

#### 7.3.1 GENERAL PERFORMANCE CRITERIA

##### **Performance criterion A**

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

##### **Performance criterion B**

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

##### **Performance criterion C**

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

----- The following blanks -----



## 7.4 ELECTROSTATIC DISCHARGE(ESD)

### 7.4.1 TEST SPECIFICATION

Test Requirement:	ETSI EN 301 489-17 V3.2.4 /7.2.1 ETSI EN 301 489-1 V2.2.3/9.3 EN 55035:2017/A11:2020 Table 1
Test Method:	EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Air Discharge : $\pm 2$ kV, $\pm 4$ kV, $\pm 8$ kV; Contact Discharge: $\pm 4$ kV
Polarity:	Positive & Negative
Number of Discharge:	10 times at each test point
Discharge Mode:	Single Discharge 1 second

### 7.4.2 TEST PROCEDURE

#### The basic test procedure was in accordance with EN 61000-4-2:

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manner:

- (1) The test shall be performed with single discharges. On each pre-selected point at least 10 single discharges (in the most sensitive polarity) shall be applied.

NOTE 1 The minimum number of discharges applied is depending on the EUT; for products with synchronized circuits the number of discharges should be larger.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.

NOTE 2 The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.

#### Vertical Coupling Plane (VCP):

The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

#### Horizontal Coupling Plane (HCP):

The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane.

The four faces of the EUT will be performed with electrostatic discharge.

- (2) Air discharges at insulation surfaces of the EUT.

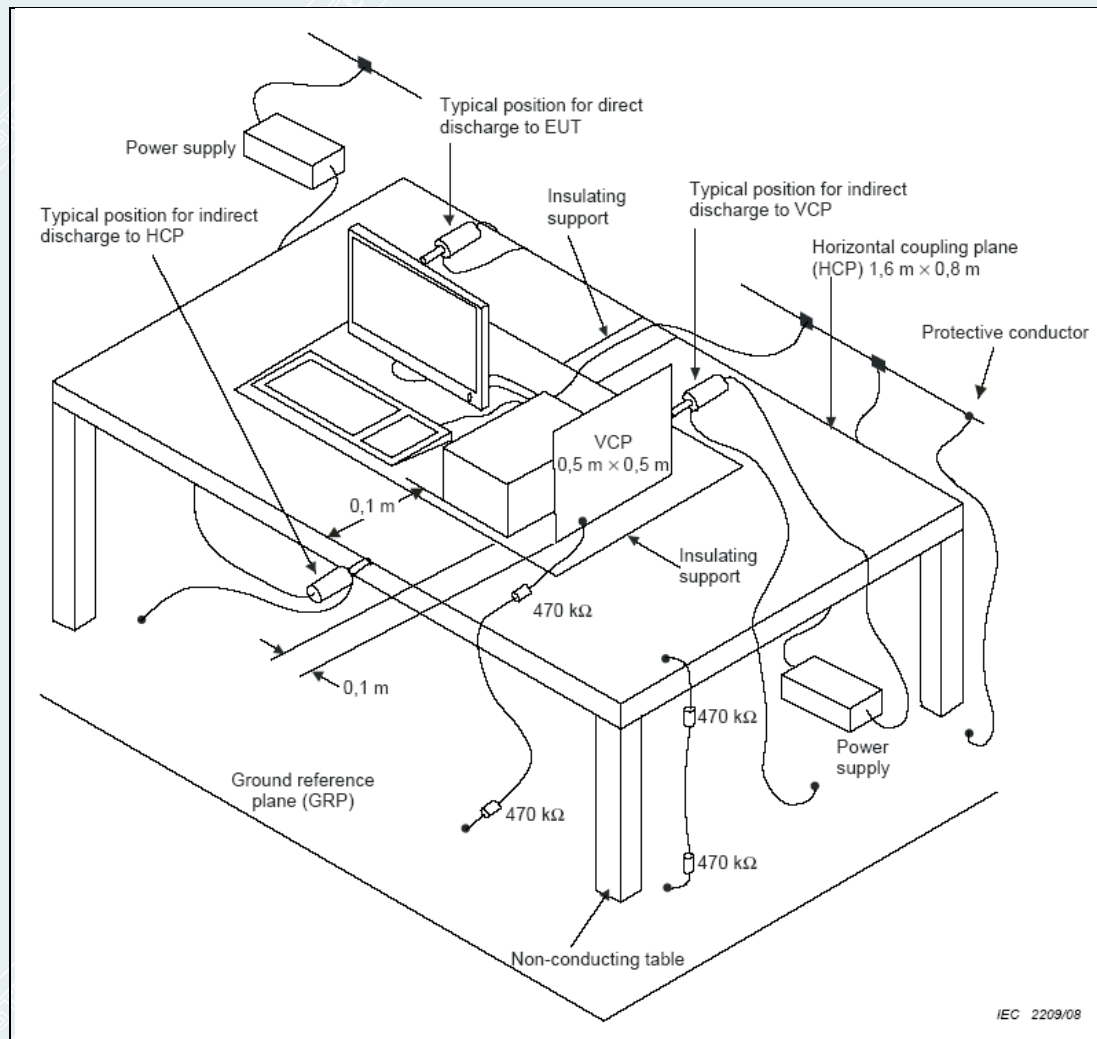
It was at least ten single discharges with positive and negative at the same selected point.

- (3) For TABLE-TOP equipment:

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective

grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940k total impedance. The equipment under test was installed in a representative system as described in EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 1-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

### 7.4.3 TEST SETUP



### 7.4.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

Please refer to the attached document E20230828994601-15 Test Photo.

**7.4.5 TEST RESULTS**

EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	23.2°C/45%RH/101kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-10-26	Sample No.	E20230828994601-0011

For EN55035:

Discharge point	Discharge voltage	C-Conduct A-Air	Required Performance	Actual performance	Result
Vertical coupling plane	±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
Horizontal coupling plane	±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
Gaps	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
Indicator light	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
Button	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
NOTE: 1) Before test, during test and after test, the EUT function is normal.					

For ETSI EN 301489-1 /ETSI EN301489-17:

Discharge point	Discharge voltage	C-Conduct A-Air	Required Performance	Actual performance	Result
Vertical coupling plane	±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
Horizontal coupling plane	±4kV	C	Criterion B	Criterion A <sup>1)</sup>	PASS
Gaps	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
Indicator light	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
Button	±2kV, ±4kV, ±8kV	A	Criterion B	Criterion A <sup>1)</sup>	PASS
NOTE: 1) Before test, during test and after test, the EUT function is normal.					

## 7.5 RADIATED RADIO-FREQUENCY ELECTROMAGNETIC FIELD (RS)

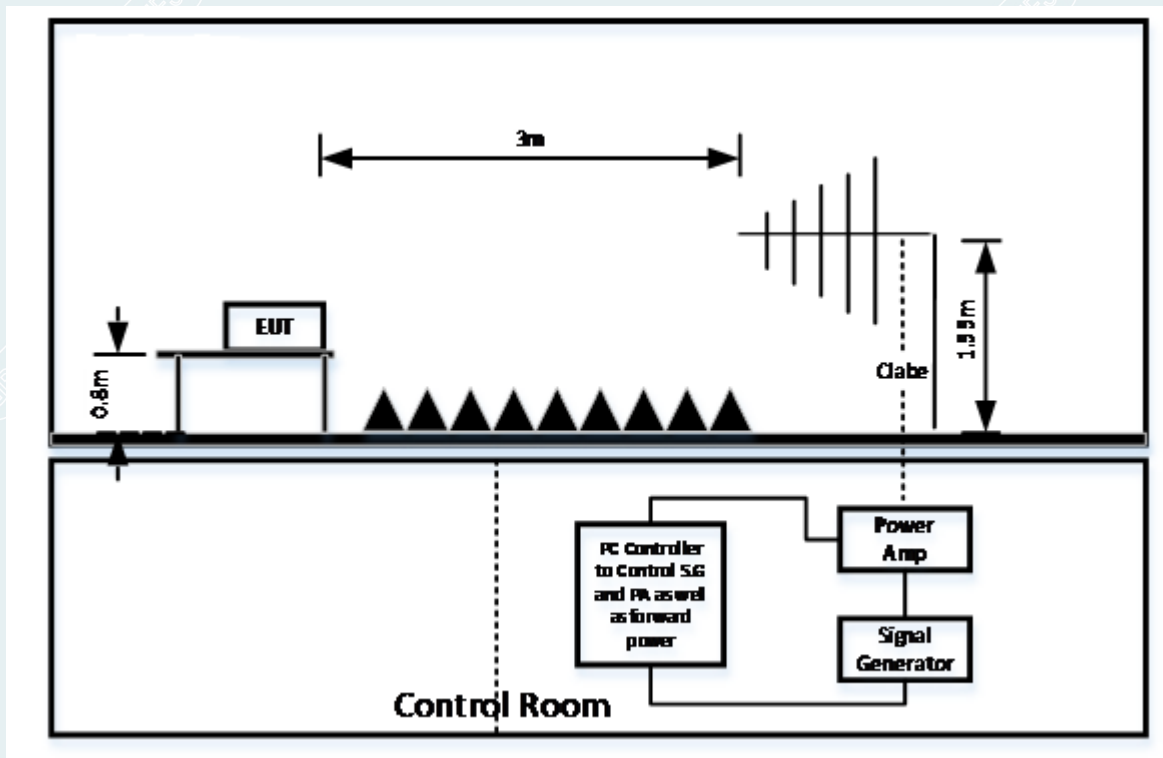
### 7.5.1 TEST SPECIFICATION

Test Requirement:	ETSI EN 301 489-17 V3.2.4 /7.2.1 ETSI EN 301 489-1 V2.2.3/9.2 EN 55035:2017/A11:2020 Table 1
Test Method:	EN 61000-4-3
Frequency Range:	EN 55035: 80MHz~1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz ETSI EN 301 489-17, ETSI EN 301 489-1: 80MHz ~ 6000MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.55m

### 7.5.2 TEST PROCEDURE

- (1) The testing is performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- (2) The frequency range is swept from 80 MHz ~6000 MHz, with the signal 80% amplitude modulated with a 1 kHz sine-wave. The rate of sweep did not exceed  $1.5 \times 10^{-3}$  decade/s, where the frequency range is swept incrementally; the step size is 1% of preceding frequency value.
- (3) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.
- (4) The test is performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 7.5.3 TEST SETUP



**NOTE:**

**(1) Table-top equipment**

The EUT installed in a representative system as described in section 7.1 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

**(2) Floor-standing equipment**

The EUT installed in a representative system as described in section 7.2 of EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

**Note: the EUT is a table-top equipment.**

### 7.5.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

Please refer to the attached document E20230828994601-15 Test Photo.



EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	25.1℃/53%RH/101kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-10-27	Sample No.	E20230828994601-0011

Frequency (MHz)	Field strength (V/m)	EUT orientation	Antenna polarization	Required criterion	Actual performance	Result
80~6000	3	Front	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Left	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Right	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Rear	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass

NOTE:

1)Before test, during the test, and after test, the EUT function is normal.

2)The RF FREQUENCY 2280~2603.5 MHz is exempted as required by the standards.

Frequency (MHz)	Field strength (V/m)	EUT orientation	Antenna polarization	Required criterion	Actual performance	Result
80~1000	3	Front	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Left	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Right	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Rear	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
1800, 2600, 3500, 5000	3	Front	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Left	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Right	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass
		Rear	H	Criterion A	Criterion A <sup>1)</sup>	pass
			V	Criterion A	Criterion A <sup>1)</sup>	pass

NOTE: 1)Before test, during the test, and after test, the EUT function is normal.

## 7.6 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST

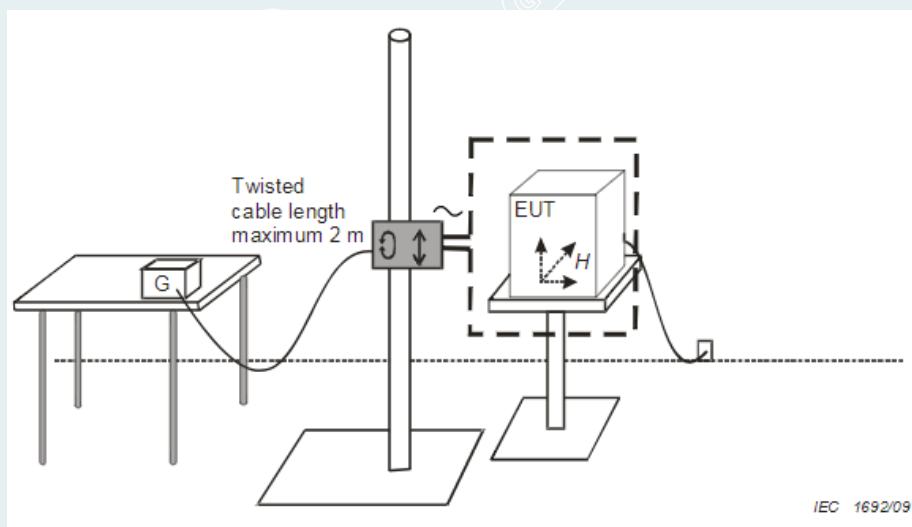
### 7.6.1 TEST SPECIFICATION

Test Requirement	EN 55035:2017/A11:2020
Test Method	EN 61000-4-8
Frequency	50Hz&60Hz
Field Strength	1 A/m
Observation Time	5 min
Inductance Coil	Rectangular type, 1mx1m
Direction	X-axis, Y -axis, Z -axis

### 7.6.2 TEST PROCEDURE

- The equipment is configured and connected to satisfy its functional requirements. It shall be placed on the GRP with the interposition of a 0.1m-thick insulating support.
- The equipment cabinets shall be connected to the safety earth directly on the GRP via the earth terminal of the EUT.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

### 7.6.3 TEST SETUP



### 7.6.4 PHOTOGRAPH OF THE TEST ARRANGEMENT

Please refer to the attached document E20230828994601-15 Test Photo.

7.6.5 TEST RESULTS

EUT Name	Motion and Light Sensor P2	Model	ML-S03D
Environmental Conditions	25.5℃/53%RH/101kPa	Test Mode	Mode 1
Power supply	DC 3V	Tested By	Yin Xiaogang
Test Date	2023-10-24	Sample No.	E20230828994601-0011

Field Strength (A/m)	Frequency (Hz)	Observation Time (min)	Direction	Required Performance	Actual performance	Result
1	50	5	X	A	A <sup>1)</sup>	PASS
1	50	5	Y	A	A <sup>1)</sup>	PASS
1	50	5	Z	A	A <sup>1)</sup>	PASS
1	60	5	X	A	A <sup>1)</sup>	PASS
1	60	5	Y	A	A <sup>1)</sup>	PASS
1	60	5	Z	A	A <sup>1)</sup>	PASS

NOTE: 1)Before test, during the test, and after test, the EUT function is normal.

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## **APPENDIX A. PHOTOGRAPHS OF EUT**

Please refer to the attached document E20230828994601-16 EUT photo.

----- End of Report -----